



Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers asphalt cements graded by viscosity at 140°F (60°C) for use in pavement construction. Three sets of limits are offered in this specification. The purchaser shall specify the applicable table of limits. In the event the purchaser does not specify limits, Table 1 shall apply. For asphalt cements graded by penetration at 77°F (25°C) (see Specification D 946). If needed, volume corrections for asphalt cements should be made according to Practice D 4311.

2. Referenced Documents

2.1 ASTM Standards:

- D 5 Test Method for Penetration of Bituminous Materials²
- D 92 Test Method for Flash and Fire Points by Cleveland Open Cup³
- D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation³
- D 113 Test Method for Ductility of Bituminous Materials²
- D 140 Practice for Sampling Bituminous Materials²
- D 946 Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction²
- D 1754 Test Method for Effect of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)²
- D 2042 Test Method for Solubility of Asphalt Materials in Trichloroethylene²
- D 2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)²
- D 2171 Test Method for Viscosity of Asphalts by Vacuum

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² *Annual Book of ASTM Standards*, Vol 04.03.

³ *Annual Book of ASTM Standards*, Vol 05.01.

Capillary Viscometer²

- D 2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)²
- D 4311 Practice for Determining Asphalt Volume Correction to a Base Temperature²

3. Manufacture

3.1 The asphalt cement shall be prepared from crude petroleum by suitable methods.

4. Physical Requirements

4.1 The asphalt cement shall be homogeneous, free from water, and shall not foam when heated to 347°F (175°C).

4.2 The asphalt cements shall conform to the requirements given in Table 1, Table 2, or Table 3, as specified by the purchaser.

5. Methods of Sampling and Testing

5.1 Sample and test asphalt cements in accordance with the following methods:

- 5.1.1 *Sampling*—Practice D 140.
- 5.1.2 *Water*—Test Method D 95.
- 5.1.3 *Viscosity at 140°F (60°C)*—Test Method D 2171.
- 5.1.4 *Viscosity at 275°F (135°C)*—Test Method D 2170.
- 5.1.5 *Penetration*—Test Method D 5.
- 5.1.6 *Flash Point, Cleveland Open Cup*—Test Method D 92 (see Table 1 and Table 2).
- 5.1.7 *Solubility in Trichloroethylene*—Test Method D 2042.
- 5.1.8 *Thin-Film Oven Test*—Test Method D 1754 (see Table 1 and Table 2).
- 5.1.9 *Rolling Thin-Film Oven Test*—Test Method D 2872 (see Table 3).
- 5.1.10 *Ductility*—Test Method D 113.

TABLE 1 Requirements for Asphalt Cement, Viscosity Graded at 140°F (60°C)

NOTE 1—Grading based on original asphalt.

Test	Viscosity Grade				
	AC-2.5	AC-5	AC-10	AC-20	AC-40
Viscosity, 140°F (60°C), P	250 ± 50	500 ± 100	1000 ± 200	2000 ± 400	4000 ± 800
Viscosity, 275°F (135°C), min, cSt	80	110	150	210	300
Penetration, 77°F (25°C), 100 g, 5 s, min	200	120	70	40	20
Flash point, Cleveland open cup, min, ° F (°C)	325 (163)	350 (177)	425 (219)	450 (232)	450 (232)
Solubility in trichloroethylene, min, %	99.0	99.0	99.0	99.0	99.0
Tests on residue from thin-film oven test:					
Viscosity, 140°F (60°C), max, P	1250	2500	5000	10 000	20 000
Ductility, 77°F (25°C), 5 cm/min, min, cm	100 ^A	100	50	20	10

^A If ductility is less than 100, material will be accepted if ductility at 60°F (15.5°C) is 100 minimum at a pull rate of 5 cm/min.

TABLE 2 Requirements for Asphalt Cement Viscosity Graded at 140°F (60°C)

NOTE 1—Grading based on original asphalt.

Test	Viscosity Grade					
	AC-2.5	AC-5	AC-10	AC-20	AC-30	AC-40
Viscosity, 140°F (60°C), P	250 ± 50	500 ± 100	1000 ± 200	2000 ± 400	3000 ± 600	4000 ± 800
Viscosity, 275°F (135°C), min, cSt	125	175	250	300	350	400
Penetration, 77°F (25°C), 100 g, 5 s, min	220	140	80	60	50	40
Flash point, Cleveland open cup, min, ° F (°C)	325 (163)	350 (177)	425 (219)	450 (232)	450 (232)	450 (232)
Solubility in trichloroethylene, min, %	99.0	99.0	99.0	99.0	99.0	99.0
Tests on residue from thin-film oven test:						
Viscosity, 140°F (60°C), max, P	1250	2500	5000	10 000	15 000	20 000
Ductility, 77°F (25°C), 5 cm/min, min, cm	100 ^A	100	75	50	40	25

^A If ductility is less than 100, material will be accepted if ductility at 60°F (15.5°C) is 100 minimum at a pull rate of 5 cm/min.

TABLE 3 Requirements for Asphalt Cement Viscosity Graded at 140°F (60°C)

NOTE 1—Grading based on residue from rolling thin-film oven test.

Tests on Residue from Rolling Thin-Film Oven Test: ^A	Viscosity Grade				
	AR-1000	AR-2000	AR-4000	AR-8000	AR-16000
Viscosity, 140°F (60°C), P	1000 ± 250	2000 ± 500	4000 ± 1000	8000 ± 2000	16000 ± 4000
Viscosity, 275°F (135°C), min, cSt	140	200	275	400	550
Penetration, 77°F (25°C), 100 g, 5 s, min	65	40	25	20	20
% of original penetration, 77°F (25°C), min	...	40	45	50	52
Ductility, 77°F (25°C), 5 cm/min, min, cm	100 ^B	100 ^B	75	75	75
Tests on original asphalt:					
Flash point, Cleveland open cup, min, °F (°C)	400 (205)	425 (219)	440 (227)	450 (232)	460 (238)
Solubility in trichloroethylene, min, %	99.0	99.0	99.0	99.0	99.0

^A Thin-film oven test may be used but the rolling thin-film oven test shall be the referee method.

^B If ductility is less than 100, material will be accepted if ductility at 60°F (15.5°C) is 100 minimum at a pull rate of 5 cm/min.

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